Midpoint Lesson

Aaron Kennedy
#1823634

I. Preinstructional planning

Key concept(s): Average/Mean
Coordinate Midpoint Property

NCTM Standard(s):
Number and Operations
Algebra
Geometry

Objectives:

Student will: initially review how to find the average via the mean. The learners will also find the midpoint of segments in a coordinate grid. Learners will recognize the midpoint property is really finding the average of both the xand y components.

Teacher will: pause when appropriate: after questions, when waiting for responses, etc. Also will circulate around the room to ensure participation by all learners.

Grade level: 9

Time allotted for lesson: 50 minutes

Student grouping: Prearranged groups of four with team member roles of resource manager, facilitator, reporter/recorder, team manager.

Special arrangements:
Mrs. Cracraft has already arranged her class into eight groups of four learners. At the front of the class is the digital projector.

Text and/or other resource(s):
Discovering Geometry: An Investigative Approach pages 36 and 37

Materials: (Please attach all graphic organizers to this lesson plan.)
Graphic Organizer (attached)
Rulers

Planning for individual differences:

I have observed the class before and there are some very quick learners that will need to be challenged. The biggest challenge will be to ensure the large number of struggling students are engaged and participating. At times, they will be working in groups or in pairs and I will remind them of their roles. There are some students that seem to be most comfortable in languages other than English. It is fine if they discuss the problem, but they should also work with their group.

Classroom management plans:

I will be following Mrs. Cracraft's daily order/sequence. I will also be using her rules.

II. Implementation of the learning sequence

Beginning activities (How will you introduce the lesson and motivate the students?) List activities and key questions.

Mrs. Cracraft always starts her Monday classes with a "circle activity". The point of this activity is to make sure everyone knows each other and encourages cooperation, not to mention perhaps is a fun way to start the class. I will definitely have them go around the circle greeting and giving their names. If there is time and I feel like it, then I may do the following game. ~ **5 minutes**

The leader picks a digit to "BUZZ," letting the group know the digit. Around a circle , each kid counts off, remembering to "BUZZ" if the chosen digit is in the number, or for more of a challenge they buzz any number that can be divided by that number. Go around the circle counting and BUZZING to 100. I.E. if the number is 7. It then goes 1,2,3,4,5,6, BUZZ, 8,9,10,11,12,13,Buzz,15,16,Buzz, 18,19,20,Buzz,22 etc.

from http://www.ultimatecampresource.com/site/camp-activity/buzz.html

Following the circle activity, a new "Patriot of the Week" is chosen. Mrs. Cracraft always has the students' notebooks handed back by the "Patriot of the Week". The students will then need to write down their full week's homework so they are prepared for the week. ~ **5 minutes**

Finally, there will be a little introduction/warm-up involving the average/mean. In their groups of four, they will all share with their groups and write down the number of compact discs (CDs) that each owns.

Who has the most? How many?
Which group has the most? Write down the total in each group.
Are you familiar with the term average? The mean? What does it mean? How do you find it?
REMEMBER to PAUSE after questioning!!!

I suspect that I will not need to tell them to find the total number and divide by the number of people. I will have a group come up and explain what to do at the projector.

We will do another quick example which should be worked individually.

George has taken three tests in Geometry. He had 59% on the first test. 65% on the second and 87% on the third. What is his average for the three tests? 59% + 68% + 86% = 213 then 213 ÷ 3 = 71%

Will have a learner show the answer and work on the projector. ~**10 minutes**

Middle (learning) activities: List activities and key questions.

Comments

Hand out the graphic organizer. Will be worked on in pairs. Resource Managers should get rulers (one for each pair) at this time. ~ **1 minute**

Initially, the graph paper will be blank and will need to have some points and lines plotted and drawn on it. Perhaps the learners will need to remember how to do this. The first number is for x (to the left or right). The second number is for y (up and down). Start with the segments below in **bold**. Also, note that if all segments are plotted the word "nice" will be revealed. ~ **10 minutes**

(3, 1) to (3, 6) with midpoint (3, 3.5)
(3, 3) to (8, 3) with midpoint (5.5, 3)
(0, 3) to (-3, -1) with midpoint (-1.5, 1)
(-9, -4) to (-9, -7) with midpoint (-9, -5.5)
(3, 1) to (8, -1) with midpoint (5.5, 0)
(9, 1) to (10, 8) with midpoint (9.5, 4.5)
(-10, -3) to (-7, -7) with midpoint (-8.5, -5)
(-5, 2) to (-3, -5) with midpoint (-4, -1.5)
(-7, -3) to (-6, -7) with midpoint (-6.5, -5)
(-3, -1) to (1, -5) with midpoint (-1, -3)
(3, 6) to (9, 7) with midpoint (6, 6.5)
(9, -1) to (8.5, -2) with midpoint (8.75, -1.5)

After we have some lines on the paper, ask if they know what the term midpoint means? Perhaps it should be apparent and someone will be able to come up with a suitable definition (point exactly in the middle between two points - mid ~ middle?!).

Next we will take an example of a line and ask them to draw a point on the line where they think the middle is. What do they GUESS/ESTIMATE the coordinates to be? How about estimating a second midpoint? Can you see if you can find a way to find the answer without guessing? ~ **3 minutes**

If they do not get the connection to the average, ask them what they would do if they wanted to find the middle score (average) of three tests? Can they do that with the points?

$$\left(\frac{(x1+x2)}{2} , \frac{(y1+y2)}{2} \right)$$

The learners will then go back and find the midpoints for all plotted points and compare to their estimates (a good way to check their work). Teacher will then circulate around the class to ensure all learners are working and doing it correctly. After sufficient time, the class will regroup and show their answers and work at the projector. ~ **10 minutes**

If there is extra time, there will be two more advanced problems. The procedure is the same, but they are in three dimensions. Solutions are:
(0, 1, 2) to (3, 3, 3) has midpoint (1.5, 2, 2.5)
(0, -1, -3) to (2, 4, 3) has midpoint (1, 1.5, 0) ~ **4 minutes**

Ending (Closing) activities: (Summarize, review, lead-in for next lesson)

Closing Activities should take about two minutes.

1. Summarize: Ask learners what they will think about doing if they come across a midpoint problem in the future. If they do not remember the formula, what will they do?

2. Lead-in for Next Lesson: Slope of a line.

3. Comment on Behavior: Hopefully it was great! Tell them to finish the plotting of line segments will reveal a message. Also, encourage them to try the 3D problems on the back of the graphic organizer.

4. Clean Up: Resource managers should collect rules and folders.

III. Postinstructional planning

How will you know if your students met your objectives?

Groups	Calculate Average of CDs Owned	Pairs in Group Plot Line Segments	Pairs Estimate Midpoints of Segment	Pairs Calculate Midpoints of Segment	
1					
2					
3					
4					
5					
6					
7					
8					

How will you know if you met your own personal objective?

I will know if I have achieved my objectives if I wait at least maybe five seconds after important questions and many groups attempt to answer. I would like to have at least 3 or 4 substantial questions like this.

I will know that I have gotten around to each group if I have gone through the above checklist for learner assessment for each group in each category.